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SOME CHANGES IN THE VEGETATION OF WESTERN KENTUCKY[1]

CHARLES A. SHULL

University of Kentucky

From early descriptions of the vegetation of Kentucky, and from observations recorded from time to time during the nineteenth century it is obvious that some striking and noteworthy changes have taken place in the vegetation, especially in the southern and western parts of the state. These changes have followed completion of the settlement of Kentucky, and have been noted particularly in the areas known as "barrens," and in the bluff and hill region along the Mississippi River, which has been known as the Cane Hills.

Several areas in Kentucky have been known as barrens, a term used to designate any extensive treeless, grassy meadow or prairie. The term does not imply infertility of soil, for these barrens were usually covered with luxuriant grasses. The most famous of these barrens, the one usually referred to as "The Barrens," is an area lying south of Green River, and southwestward from its tributary, the Little Barren River, which was described by the younger Michaux in 1802. The area at that time was 60 to 70 miles long, and almost as broad, extending a mile or two across the Tennessee state line. The region was surrounded, according to Michaux's testimony, by a belt of forest several miles in width, with the trees becoming scattered and straggling as The Barrens were approached. Of the vegetation covering this extensive tract Michaux says: "Nothing can be more tiresome than the doleful uniformity of these immense meadows" (5). The grass grew to be two or three feet tall, and the only woody plants were an occasional black oak, forerunner of its present vegetation, young hickory, some willows, and sumacs.

Geologically this formerly treeless meadow has been rather closely identified by Prof. A. M. Miller (4) with that portion of the Mammoth Cave limestone series of the Warsaw stage of the Mississippian, lying between the Green River and Tennessee.

Other barren areas lay in what is known as the Jackson Purchase, the tract of land lying between the Tennessee and Mississippi rivers. These areas are described by Loughridge (3) as originally grasslands covered with a very luxuriant growth of grass. One of them, a very irregular area, centers about the town of Mayfield, lying mainly in Graves county, and the western third of Calloway county. In a recent soil survey of Graves county, Jones (2) limits the barrens to the yellow silt loam areas which have an undulating topography, while the hilly portions of this region which have a surface soil of yellow-brown silt loam, are said to have been covered with a growth of timber.

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[1] Contributions from the Botanical Laboratories of the University of Kentucky, No. 4.

The other barren, much smaller in extent, lies in McCracken and Ballard counties, just south of the Ohio River Valley flats, and extending southward to within a few miles of Mayfield Creek. Of the first of these Purchase district barrens, west of Mayfield, Loughridge writes: "It is said that twenty-five years ago the prairie grass was as high as the head of a man on horseback." That would have been just prior to the outbreak of the Civil War. Southwest of Mayfield about 15 miles there is a village known as Pilot Oak. The original pilot oak is said to have been a large post oak, the only tree visible for miles around, which served as a landmark to early settlers following the trail to Mayfield. The region between Pilot Oak and Mayfield is now well forested where the land is not being cultivated.

These barrens doubtless owed their origin to fires. Michaux records that it was the custom of the Indians to burn over The Barrens during the early spring to facilitate the chase of game, prior to the settlement of the state by whites, and the custom was continued by settlers who found it advantageous to remove the long dead grass for early grazing. The various barren areas probably had similar origins, which would account for the presence of great treeless prairies in the midst of forests where there seem to be no edaphic nor climatic factors to maintain such conditions.

None of these areas is barren (treeless) now, excepting as it is farmed. The custom of burning over large areas ceased long ago, and trees, mainly oaks, began to come in. There is at present no conspicuous difference between the barren districts and the surrounding country as to number of trees. In the barrens of the Jackson Purchase, the pioneer oak of this forestation of the meadows was the black jack, *Quercus marilandica,* which was followed by *Q. rubra.* The hill forests mentioned by Jones no doubt furnished the acorns which seeded the grassy areas to black jacks and red oaks. The black jack is often seen coming up at some distance from other trees, and may be somewhat favored in its distribution.

The transformation which has occurred in these regions has gone so far that the barrens are only a memory. The regions still go by the name but it has no significance now. In recent years the forests have become so diversified that they differ in no important particular from other upland forest regions. Most recent estimates (1) show that over 800,000 acres of forest exist in Michaux's Barrens, with *Q. velutina* the dominant tree. The monotonous grassland now has approximately five hundred million board feet of black oak alone standing on it, with beech, post oak, and white oak as important members of the forest.

Another interesting change has occurred in the Cane Hills region along the Mississippi. These hills form a narrow belt bordering the top of the bluffs, from one to three or four miles in width, which Loughridge states "is characterized throughout (Louisiana, Mississippi, Tennessee, and Kentucky) by the same soils and timber growth, together with an undergrowth of cane," *Arundinaria macrosperma.*

The belt in Kentucky is divided into three parts. One begins at the Tennessee state line, just two miles east of the northern end of Reelfoot Lake, and extends northward to the valley of Bayou de Chien. Hickman stands partly upon the last spur of this upland. The belt is almost five miles wide at the state line, but narrows rapidly toward Hickman to about half a mile in width. The southern part of this area is extremely rugged and broken.

A second portion of the belt lies between the valleys of Obion Creek and Mayfield Creek, being widest from Columbus to McLeod's Bluff on Obion. The third portion extends from Mayfield Creek valley to Shawnee Creek, and is broken into several parts by Cane Creek, and a small valley at Wickliffe. The main area lies north and northeastward from Wickliffe.

Of the area south of Hickman, Loughridge says: "Cane undergrowth is a characteristic feature of the surface growth throughout the bluff." He mentions the fine timber of the Columbus area, "walnut, poplar, maple, hickory, white oak, sweet gum, papaw, grape vines, and cane." At another place he remarks that "a cane undergrowth once prevailed on the bluffs, but is kept down by the grazing of stock." The northern part of the belt, about Wickliffe, is described as having had a dense cane undergrowth, but "has been eaten down yearly by stock."

During the summer of 1919 a part of my vacation was spent along the Mississippi, and particular attention was given to this Cane Hill belt. It was hoped that remoter sections of the area might afford opportunity to study the dynamics of the association. In this I was destined to be disappointed, for though the entire district was traversed on foot in various directions with the exception of about three miles between Berkeley and Laketon, and the least disturbed areas sought out, only four vestiges of cane were found on the hills, and but one of these gave any conception of what the original condition must have been.

The first of these was a small area along the lower bluff about half way between Hickman and the Tennessee line. The cane extended fifty to sixty feet in length, by ten to thirty feet in width, and grew from five to ten feet tall. The trees under which it was growing were mainly *Fagus grandifolia.* The other important members of the bluff forest at this point were *Liquidambar styraciflua, Liriodendron tulipifera, Celtis mississippiensis, Juglans nigra, Acer saccharum,* and *Sassafras variifolium.* The cane did not run up the bluff, and none was found on top, nor on the hills and uplands behind them.

Another vestige was found south of Berkeley about two and one fourth miles, in Cane Creek bottom. In this case it was not associated with forest, but lay within the Cane Hill region, speaking geologically. This occurrence is not considered unusual, as cane is frequently seen along stream bottoms in widely scattered places in the state.

The third vestige was seen north of Laketon, along the Mobile and Ohio railroad, which lies at the base of the bluffs. Here the cane ascends the bluff in a scattering way for one to two hundred feet. In most cases it extended from the base to half way up the slope, and in one or two places it was found within fifteen or twenty feet of the top. There was none to be found among the trees on the upland. Workmen at Laketon assured me that occasionally it could be found in small, low, thin patches on top of the bluff, but none was seen. The specimens on the slope were from two to six feet tall, and were growing under *Fagus grandifolia, Quercus rubra,* and *Q. alba, Fraxinus americana, Robinia Pseudo-acacia, Tilia americana,* etc.

The best remnant of the association was found about two miles north of Wickliffe, where the bluff of Cane Creek joins at a right angle the bluff of the Mississippi. About 100 feet back from the juncture of the two bluffs, on the Cane Creek side, there is a growth of cane under the bluff forest which comes up the slope from 150 to 200 feet, and extends along Cane Creek for a distance of several hundred feet. This was the only case found in which it reached the brow of the slope. The trees among which it is growing are *Celtis mississippiensis, Q. rubra, Juglans nigra, Cornus florida, Ulmus fulva, Fraxinus americana, Acer saccharum, Carya glabra,* and *Morus rubra.* The cane formed perhaps one third of all the undergrowth, but because of its size gave the dominant aspect to the area. It was from three to ten feet tall. Many of the older plants were dead or dying, and it is probably going the way the rest of the association has gone. The level upland at this point was under cultivation, and no other areas where cane existed under an upland forest could be found.

It is apparent that the Cane Hills are no longer *cane* hills. One elderly man at Columbus assured me that once upon a time the cane was all up over the hills, while other younger people, born and raised in the region said they had never seen anything but "switch" cane on the hills, and very little of it at that. I am inclined to think that the cane was once a prominent feature of the vegetation, but that it has been practically destroyed as an upland forest plant. And even on the lowlands, I am told, it is rapidly decreasing in abundance in the central Mississippi valley.

The reasons usually assigned for the destruction of *Arundinaria macrosperma* are grazing and floods; and the floods would probably not seriously affect it if it were not for grazing. The fondness of stock for this grass is well known; its nutritiousness and fattening qualities are attested by all who have had experience with it, and the effects of complete grazing have been noted from the earliest historical records of the region. The elder Michaux visited Kentucky in 1793, where he saw cane growing abundantly. He mentions the fact that it is destroyed when completely eaten down by cattle; and that hogs also kill it out by rooting it up. He calls attention, moreover, to the fact that *Arundinaria macrosperma* rarely produces seed in this part of its range. Therefore vegetative destruction cannot be made good by seeding.

As the Mississippi River counties of Kentucky, Ballard, Carlisle, Hickman, and Fulton have had fencing laws only a very short time, two years in one case, and as enforcement has never been rigid, stock has had free range of all unfenced land. It is surprising how bare some of the most thoroughly grazed bluffs had become. The effect which grazing was having, particularly in the northern counties, was noted as in progress by Loughridge, but now the destruction of cane as an upland forest undergrowth seems to be practically complete.

In the lowlands, grazing tends to keep the stalks small and short, and I am told that when these short stalks are completely covered with water during floods they tend to drown out. I was unable to confirm this by observation, but a number of people informed me that cane was very much less abundant now than formerly, and growing less abundant all the time. As the ungrazed plants often reach a height of twenty-five to thirty feet, these would not be affected by river floods. Therefore grazing is probably responsible, directly and indirectly, for this rather rapid disappearance of cane from this particular portion of its range in the Mississippi Valley.

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